



PHENIX EM-Cal PbGI OPERATIONS IN THE PEH

procedure name

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Approvals

_____ PHENIX S E & I	_____ Date	_____ Cognizant Scientist/Engineer /Activity Manager	_____ Date
_____ PHENIX Safety	_____ Date	_____ CA-D ES&H/ SAFETY	_____ Date
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PbGl EMCal in the PEH for Physics Run (PR)-2000

1. Purpose

The purpose of this document is to define the modes of operation of the PHENIX PbGl EMCal subsystem in the PEH (PHENIX Experimental Hall) before and during the Physics Run 2000. Following the rules in this document will ensure:

- A. the safety of all personnel from risks associated with the operation of the high voltage systems required to power the photomultiplier tubes inside the PbGl EMCal supermodules of the sector E1,
- B. the implementation of the appropriate emergency approaches,
- C. prompt notification of the appropriate RHIC and S&EP specialists,
- D. the maintenance of appropriate RHIC emergency status,
- E. the preservation and protection of the environment, and
- F. the preservation of BNL facilities and equipment.

2. Responsibilities

During the PR, there will be two levels of responsibility for the oversight of the PbGl EMCal subsystem.

The first level of responsibility will be the PHENIX Shift Crew.

Prior to data taking, there will be a period of calorimeter commissioning when calorimeter is tested at high voltage before the IR is closed and the calorimeter is inaccessible. During this commissioning phase the calorimeter HV&LV systems will be monitored by the team of calorimeter experts. A record of the performance of the PbGl EMCal system will be kept by the experts.

During data taking, it will be the responsibility of the PHENIX shift crew to:

- 2.1 Monitor the status and alarms for the EMCal HV & LV system according to a prescribed check off list at least once a shift (eight hours).
- 2.2 In the event of an alarm or irregularity, contact an expert from the Expert Call List given in the appendix.

The second level of responsibility is the calorimeter experts. It is the responsibility of the calorimeter experts to:

- 2.3 Maintain the PbGl Calorimeter subsystem in a safe operating condition. This includes:
 - 2.3.1 setting, adjusting, and checking the LV power supplies,
 - 2.3.2 setting, adjusting, and checking the LEDs and PIN photodiodes ,
 - 2.3.3 setting, adjusting, and checking the HV for all bases of the sector E1.
 - 2.3.4 posting any special instructions or notifications as required, and carrying out any emergency actions, as prescribed in the Procedures section of this document.

3. Prerequisites

The following trainings and read-and-acknowledge documents are required for the calorimeter experts:

- 3.1 PHENIX specific fall protection document,
- 3.2 PHENIX Access Awareness document,
- 3.3 PHENIX Skill of Craft document,
- 3.4 Emergency procedures for the PHENIX experiment (AD-3.16),

- 3.5 geographical layout of the experimental area (routes of egress, location of emergency equipment, phones and controls)

In case electrical work is required one should also obtain:

- 3.6 Electrical Safety I (HP-OSH-150B)

The calorimeter experts shall train all personnel involved in the PbGl EMCAL running in the safe operation of the PbGl EMCAL HV&LV system.

4. Precautions

The safety of personnel is of primary importance. The calorimeter experts and shift crew members shall take great care to ensure that the EMCAL subsystem will be operated in a way that does not place personnel at risk of physical harm.

- 4.1 HV system precautions:

There are no HV power supplies (LeCroy mainframes or similar) used for the PbGl subsystem. The needed HV is generated by Cockcroft-Walton type generators at the bases, which are enclosed within the eight electronics enclosures on the back of a sector. When the doors to the enclosures are closed, no HV carrying parts or components are accessible by personnel. Switches at all doors prevent the HV to be active if a door is opened. These interlock switches directly cut the main AC power to the LV power supplies used for operating the Cockcroft-Walton generators. As a consequence – the HV system will not operate with any of the eight enclosure doors open.

- 4.2 LV system precautions:

The PbGl EMCAL uses three kinds of low voltage power supplies. The first one (VERO MONOVOLT PK 120 type - one per PbGl Sector) provides +5V/20A required for the controlling electronics on the Cockcroft-Walton generators. The second one (Delta Electronics 1200 S 48 - one per PbGl Sector) provides +50V(+55V)/20A required for generating the HV on the Cockcroft-Walton bases. Both of the above mentioned powers are delivered from the LV power supply racks (one for each PbGl Sector) to the detector and distributed among the so-named Repeater-boxes (for 480 bases/photomultipliers each) via fuse-protected terminal blocks installed on DIN-rails inside the sector enclosures. The sector door interlocks control the main AC power to these two power supplies (see 4.1). The third kind of low voltage power supplies (+/- 6V) are required for the operation of the FEM crates. This power is delivered from the LV power supply rack to the detector and distributed among the crates via fuse-protected terminal blocks installed on DIN-rails inside of the sector enclosures. Because the voltages are low, these LV wires may stay energized while the doors are open to allow test-work on the FEM crates.

5. Standard Operating Procedures

HV System Procedures:

There are two possibilities for HV system procedures - in 1) Test and 2) Normal Operations Modes.

- 5.1 ***Test Operations HV System Procedures Mode*** is used if experimental hall is opened for the detector experts. In the case follow this procedure for turning ON/OFF the HV for the PbGl EMCAL, Sector E1:

- 5.1.1 Check the AC power for ECS22 on the Rack Control Panel.

- 5.1.2 Turn on the AC breaker switch for 5V/55V power supplies at the Rack Control Panel.
- 5.1.3 Turn on the key on Control Crate, which contains the 5V power supply.
- 5.1.4 Push the green button (ON) on Control Crate.
- 5.1.5 Control visually the 5V on the front voltage meter and wait for the 55V to appear after a delay of approx. 20 sec.
- 5.1.6 Set individual and group HV values from the PbG1 HV Control Screen of the Counting House.
- 5.1.7 For turning off the HV : Set all HV values to zero from PbG1 HV Control Screen and push the red button (OFF) on Control Crate on ECS22. Check with the build in meter that the 55V dissappeared. After a delay of approx. 10 sec. The 5V will be switched off too.

5.2 **Normal Operations HV System Procedures Mode:** In normal operations the experimental hall will be closed to personnel, making access to any HV point impossible. Under such conditions, follow this procedure for turning on the HV:

- 5.2.1 Make sure that the Phenix "Check off list for IR closing", PP-2.5.3.14-09 was followed.
- 5.2.2 Turn on the 5V/55V power supplies by LV Control Screen in the Counting House. Wait for 20 sec and check the LV levels.
- 5.2.3 Set individual and group HV values from the PbG1 HV Control Screen in the Counting House.
- 5.2.4 For turning off the HV: Set all HV values to zero from PbG1 HV Control Screen and turn off the 5V/55V power supplies by LV Control Screen of Counting House (turning off the LV power is needed only for longer periods of switched off HV).

5.3 **Normal Operations LV System Procedures Mode:** This is the standard mode for turning the PbG1 LV system on and off.

- 5.3.1 Make sure that the Phenix "Check off list for IR closing", PP-2.5.3.14-09 was followed.
- 5.3.2 Turn on the LV power supplies by LV Control Screen in the Counting House. Wait for 20 sec and that the control light turned red.
- 5.3.3 For turning off the LV: Turn on the LV power supplies by LV Control Screen in the Counting House. Wait for 20 sec and that the control light turned green.

6. HV lock out procedure during maintenance

- 6.1 Since the HV is included in the sector door interlock system (see 4.1) no special lock out procedure is mandatory to avoid working while the HV is on.
- 6.2 To avoid that by accident the HV is on before you start your work and is shut off through the door interlock, lock out the HV system by the following steps:
 - 6.2.1 Turn the key switch from the control crate the contains the 5V power supply and the controlling electronics to off and take the key with you. That turns off the AC power to the LV power supplies needed by the HV system.
 - 6.2.2 Start the maintenance work.
 - 6.2.3 After finishing your work, close all doors, put the key back to the control crate and turn it on.

7. Documentation

- 7.1 None.

8. References

- 8.1 C-A Department OPM 3.0, "Local Emergency Plan for the C-A Department."
- 8.2 BNL Environment, Safety & Health Standard, (<http://sbms.bnl.gov/ld/ld08/ld08t011.htm>).
- 8.3 Phenix "Check off list for IR closing", PP-2.5.3.14-09

Appendix

1. Call list for the PbGI EMCAL subsystem experts.

1.1	Terry Awes	x1023
1.2	Damian Bucher	x8420
1.3	Sasha Vinogradov	x3912

2. Schematic of the PbGI EMCAL HV/LV power supply system.

